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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/037,586	01/04/2002	Hsueh-Heng Liu	TS98-420	6504
28112	7590	12/22/2003	EXAMINER	
GEORGE O. SAILE & ASSOCIATES 28 DAVIS AVENUE POUGHKEEPSIE, NY 12603			GEYER, SCOTT B	
			ART UNIT	PAPER NUMBER
			2829	

DATE MAILED: 12/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/037,586	<b>Applicant(s)</b> LIU, HSUEH-HENG	
	<b>Examiner</b> Scott B. Geyer	<b>Art Unit</b> 2829	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 November 2003.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-24 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-24 is/are allowed.
- 6) ☒ Claim(s) 1 and 11 is/are rejected.
- 7) ☒ Claim(s) 2-10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All   b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- |                                                                                              |                                                                             |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Specification / Claim Objections*

1. The specification and claims as amended by the applicant are acceptable; accordingly, the objections to these are withdrawn.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain et al. (6,107,165) in view of Hawley et al. (5,804,500).

**3A.** As to *claim 1*, Jain et al. teach a method of making an antifuse, as described by figures 2-18. In figure 2, an insulator layer 6 is deposited over a substrate 1 which may have logic circuitry of a FPGA. A via hole 7 is formed in the insulator layer 6. A metal plug 12 (for example, tungsten) is formed in the via hole 7. A layer 20 of programmable material, such as amorphous silicon (see column 4, lines 32 et seq.) is deposited over the metal plug 12 to form an antifuse. Metal layers (see figure 17, numerals 26, 27 or 28) are then formed over the antifuse. The metal layers are then patterned (see column 6, lines 15 et seq.). Jain et al. also teach an embodiment wherein spacers 30 are formed on the sides of the antifuse, and the spacers can be formed of silicon nitride (see column 6, lines 60-61 and also figure 18). Although Jain et al. do teach active elements in a semiconductor substrate (column 3, lines 10 et seq.),

Jain et al. does not specifically teach forming a first interconnect structure contacting the active elements in the substrate. However, Hawley et al. teach a lower conductive electrode 14 (see figure 1) which is a metal layer used as an interconnect layer in the integrated circuit (column 2, lines 53 et seq.) At the time of the invention, it would have been obvious to a person of ordinary skill to modify the method of Jain et al. with an interconnect structure as taught by Hawley et al. to provide a connection between the circuitry of the underlying substrate and the antifuse.

**3B.** As to **claim 11**, Jain et al. teach the patterned second metal interconnect structure composed of a standard sputtered aluminum layer (AlSiCu) (see column 6, lines 6 et seq.).

***Allowable Subject Matter***

**4.** Claims 2-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record and to the examiner's knowledge does not teach or suggest the limitations disclosed in the above claims. For purposes of brevity, those limitations will not be repeated, however, if the applicant desires to incorporate those limitations, it is noted that the complete claim limitation must be incorporated into the base claim.

**5.** Claims 12-24 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

The previous office action outlined reasons for indicating claims 12-23 as allowable.

The prior art of record and to the examiner's knowledge does not teach or render obvious, at least to the skilled artisan, the instant invention regarding forming a metal layer on an antifuse spacer and an antifuse, wherein the metal layer is not a barrier layer as recited in step (H), in combination with the other claimed limitation steps (A-G and I) of claim 24.

### ***Response to Arguments***

6. Applicant's arguments filed 11-12-03 have been fully considered but they are not persuasive. The applicant has argued on page 10 of the filed response that the references have not been properly combined, that the two references teach incompatible processes and that the references do not suggest they be combined. The examiner disagrees with each of these assertions by the applicant.

**6A.** As to the two references not being properly combined: "Hawley et al." was brought in to teach that which was missing from "Jain et al.", as is clearly laid out in the 35 USC § 103 rejection above. Without a clear explanation by the applicant as to what specifically was not proper about combining the two references, the examiner has repeated the rejection above and asserts that the rejection is clear and concise.

**6B.** As to the two references teaching incompatible processes: "Jain et al." teach a metal-to-metal antifuse having improved barrier layer and "Hawley et al." teach a fabrication process for raised tungsten plug antifuse. Both references deal with the subject of semiconductor manufacturing and more specifically deal with anti-fuses. As

such, it is unclear as to why the applicant asserts that the two references teach incompatible process, especially in light of the lack of any detailed explanation. The examiner maintains that the two references are analogous art and do teach compatible processes.

**6C.** As to the references lacking a suggest for combination: the motivation for combining the two references was clearly stated in the 35 USC § 103 rejection above. The applicant is reminded that reasons for motivation can be found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. (see MPEP 2143.01).

***Conclusion***

**7. THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott B. Geyer whose telephone number is (703)

Application/Control Number: 10/037,586  
Art Unit: 2829

Page 6

306-5866 (*after 1-13-04, the examiner may be reached at 571-272-1958*). The examiner can normally be reached on weekdays, between 10:00am - 6:30pm. E-mail: [scott.geyer@uspto.gov](mailto:scott.geyer@uspto.gov)

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (703) 308-1233. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9318.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

SBG. 12/11/03

SBG  
December 11, 2003

  
**EVAN PERT**  
**PRIMARY EXAMINER**